

Armands CELMS<sup>1a</sup>, Ihor TREVOHO<sup>2</sup>, Pavlo KOLODIY<sup>3</sup>, Jolanta LUKSA<sup>1b</sup>, Māris VIRKAVS<sup>1</sup>, Toms LIDUMNIEKS<sup>1;4</sup>

<sup>1</sup> Latvia University of Life Sciences and Technologies, e-mail: <sup>1a</sup>armands.celms@lbtu.lv,

<sup>1a</sup> <https://orcid.org/0000-0002-9673-1734>; <sup>1b</sup> <https://orcid.org/0000-0002-9673-1734>

<sup>2</sup> Lviv Polytechnic National University, 12, S. Bandery Str., Lviv, 79013, Ukraine;

<https://orcid.org/0000-0002-2368-9088>

<sup>3</sup> Lviv National Environmental University, <https://orcid.org/0000-0001-9847-9520>

<sup>4</sup> Latvian Geospatial Information Agency

<https://doi.org/10.23939/istcgcap2024.100.005>

## LAND CADASTRAL SURVEYING FOR REAL ESTATE IN MADONA MUNICIPALITY IN THE REPUBLIC OF LATVIA

Land cadastral surveying is of fundamental importance in the land management of the State territory. This applies both to land properties within the country and to the external borders of countries – including the demarcation of the national border. When transitioning from the common ownership system of land use in the USSR to the earlier, independent system of ownership of land properties that existed in the country of Latvia, the state administration system faced the need to implement land reform, moving from ownerless (the entire nation) land ownership to individual and collective land ownership in the country. It was important to have a political stance, to restore the properties to their former owners or heirs as far as possible. More than 50 years had passed after the liquidation of private property rights to land, many land ownership documents had been lost. There were cases of loss or even intentional destruction of boundaries or boundary marks of former land properties. Therefore, correct and fast land property rights restoration procedures looked complicated, expensive and finally time-consuming. The purpose of research: Compare the activities of the oldest cadastral surveying processes with existing – instrumental and better technology-based methods. This is especially applicable to the processes and possibilities of surveying land property boundaries, recognizing that instrumental (geodetic) surveying of land properties in the area was and is the best way to do it, but it should have been implemented in unusually large quantities, and as quickly as possible, without blocking legal economic activity with land properties in the country. The abilities of available, prepared specialists (surveyors) and surveying entrepreneurs for survey work were also negligible. Therefore, a decision was made, within the framework of the land reform, to implement a simplified determination of the boundaries of land units with a marking methodology, which was developed and approved for use as a cadastral survey-marking methodology. On its basis, the documents provided for in the regulatory enactments were prepared, which served to make legally binding decisions on the ownership and use rights of land properties. At the same time, the simplified property registration provided a basis for territorial planning measures of local municipalities and the organization of economic activity. The variety of data registered in the cadastral survey system does not create a sense of security and reliability for clients and specialists who work with this information, therefore the cadastral survey process in Latvia must be improved both technologically, and we must not forget how to combine historical data with modern ones. Geodetic grounding plays a very important role in the process. For geodetic works and accuracy, in order to be able to legally justify discrepancies in cadastral boundaries. The changes did not create unacceptable consequences for property users and accounting systems. As an example, the study examines the comparison of the results of one land property, initially registered and later cadastral measured, which confirms the validity of the decision taken in the interests of the reform. In the beginning, it is intended to perform simplified property determination-marking works, leaving the labour-intensive surveying technologies for further clarification of the registered property over a longer period – according to the need for use.

*Key words:* land reform, land cadastral survey, land ownership, boundaries of land units, regulatory enactments.

### Introduction

The essence of the land cadastral survey is related to the preparation and submission of the land cadastral survey file for registration in the state institution. Here it is necessary to know the history of land real estate boundary formation,

boundary marking processes and acts, the rules by which the surveyors were guided when they initially marked the boundaries of land units and related documents, and the skills to conduct boundary surveys in nature and prevent possible discrepancies. At the same time, it is necessary to know and

understand the existing regulations regarding land cadastral surveying [Cadastral survey of the earth, 2024).

In Latvia, activities related to cadastral matters are regulated by the Real Estate State Cadastre Law and related Cabinet of Ministers regulations. For the operation of the cadastral information system in the country, an appropriate information system that maintains official cadastral data is created, maintained, and improved [Cadastre, 2022]. The system is maintained by the State Land Service, which operates following the "Regulations of the State Land Service" approved by the Cabinet of Ministers of the Republic of Latvia and is an administrative institution under the supervision of the Ministry of Justice. [State Real Estate Cadastre Information System, 2020]. The cadastral survey includes several successive stages of work, fulfilling the legislative requirements regarding the determination and registration of land property boundaries. The works are implemented in the following order: 1. Preparation works; 2. Territory research and survey planning; 3. Survey works; 4. Preparation of data sets and documentation; 5. Registration or updating of results. Land cadastral surveying is important both at the state and private law level, to create clarity and legality in the field of land property rights, preventing disputes about property ownership, their boundaries, and use both in rural areas and urban areas. Supports legality in property management rights by selling, gifting, bequeathing, or using assets as collateral for mortgage loan obligations. The main benefits of land cadastral surveying for their owners: 1. Legal legitimacy, certainty, and transparency of land ownership; 2. Determining the value of land within a unified system; 3. Protection of land properties and the rights of their owners; 4. State planning and management.

The cadastre system accumulates information "On the object of real estate (land unit, part of the land unit, building, group of premises): cadastral designation; a document based on which the object of immovable property is registered or updated data; cadastral survey data; boundaries, their accuracy, area; cadastral valuation data; cadastral value; the value of the stand; Owner; Hassle; the purposes of using the immovable property; information to administer real estate tax; Address; the registration number of the archival file,"

Information in the system is accumulated in the form of both texts and spatial data. [State Real Estate Cadastre Information System, 2020]. In the territory of the State of Latvia, the cadastral survey of land may be carried out by a person certified in land cadastral surveying work – a surveyor. The State Land Service shall assess the conformity of the documents submitted by the surveyor with the requirements and decide on the registration of cadastre objects, or the updating of the registered data in the Information System of the State Cadastre of Immovable Properties. According to officially published data, the number of land units in the territory of Latvia as of 1 January 2024 was – 1 041 521 (see Fig. 3.).

Historically, two land reforms had been implemented in the territory of Latvia, because of which the current land management system was formed. The first agrarian reform in Latvia was begun at the end of the First World War and the Latvian War of Independence, on November 11, 1920, it was completed in less than 17 years, on June 1, 1937. [Mierkalne, 2012. During the reform, the confiscation of manor lands, buildings, inventory, livestock was carried out, including lands in the State Fund (VZF) and divided into landless and small farmers. Then, for the first time, continuous cadastral survey of the land was carried out using geodetic support networks [National Encyclopedia 2022]. The main tasks for cadastral surveying were: 1. Determination and recording of land plot boundaries in land registers; 2. Registration of land ownership rights; 3. Correction and reconciliation of records. Earlier land registration records were also reviewed and verified, before reform in land registers or other forms of documents [National Encyclopedia 2022]. County land commissions were formed to implement the reform and in 1920 passed a law on land registry divisions. In 1937. adopted a new land register law and began the formation of a single state cadastre. In 1940, when Latvia became part of the USSR, the operation of the cadastre and land register was discontinued and, in accordance with the guidelines of power, the general nationalization of the land was implemented. [Bērziņa et al., 2013]. The second Land Reform was started after the restoration of independence of the Republic of Latvia in 1990. Then began to restore private



## Materials and methods

The basic positions for the execution of cadastral surveying works in the second stage of the realization of land reform, moving from the methodology of designating to the technologies for performing accurate geodetic measurements, were based on the boundaries of the properties and fixed boundary signs created during the designation.

Successful results were ensured by the correctly executed Strengthening of boundaries in nature, observing the following: 1) Boundary signs are installed at all points of border turns and branching, there is mutual visibility between them; 2) Border signs shall be placed in nature ensuring their long-term preservation; 3) Borders are secured by permanent standardized border signs or at least by temporary border signs; 4) Sections of borders not secured by border signs are permitted in limited cases where they can be identified by other off-road objects; 5) Permanent border signs are made of plastic or metal pipes, rods or Cross stones; 6) Temporary boundary signs can be wooden poles 1.0 m long, at least 10-15 cm in diameter; 7) External presentation of a specific model has been created for the border signs installed (See Figures 1.,2.); 8) Hidden border signs have been installed in populated areas, buried in the ground below 0.3 m from the surface of the earth, drawing up their folds. 9) In overgrown places, sections of permanent borders, border barriers up to 2 m wide have been cut, and temporary border sections – visors up to 1 m wide [Technical instructions..., 1994].

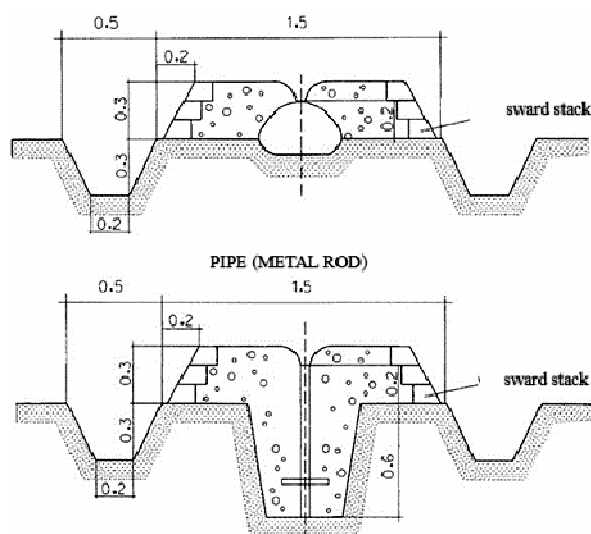


Fig. 2. Cross stone with sod stack, plastic pipe (metal rod) with sod stack

Qualitatively drawn up Boundary Designation Acts, which contain the name and address of the land user, a boundary scheme with border points, their numbers and type of securing, the nature of the boundaries (land, along the shore of the lake, the middle of a ditch, road, stream, etc.) and attachment to local landmarks, are of great importance in the search for border signs and border sites. An important document is the representation of the contours of the boundaries indicated in nature in photo maps/ photo plans M 1:10 000 according to the contour points of the situation determined in nature and recognized in the pictures. It should be taken into account that the boundaries of land units available in the spatial data of the Cadastre Information System, measured by different surveying methods, are depicted as mutually aligned, according to the accuracy of their cadastral survey, observing the conditions: -instrumentally measured land units, where the boundary points have certain coordinates, the boundaries are represented according to the coordinates specified in the cadastral survey; – for designated land units where no coordinates have been determined for the boundary points, the boundaries are represented according to the measurements made in the locality; – for designed land units (no cadastral survey has been carried out), the boundaries are depicted following the graphic annex to the document on the legal acquisition of property rights. Therefore, it should be considered that the areas of the designated and project land units may differ from the graphical area of the land unit shown on the Cadastre map, and the permissible differences in areas depend on the size of the land unit.

As one of the characteristic examples of research, here is proposed a case with real estate of a land unit in Madona county, which was subjected to repeated cadastral surveying. The property "Smiltaines", located in Sarkaņi parish of the municipality, it included one land unit with a total area of 8.3 hectares, which is designated in nature and registered in the Information System of the State Real Estate Cadastre [SLS Cadastre information ..., 2023]. The property "Smiltaines" was created in 1923 separating it from the neighboring holding "Silnieki". The status of the property was restored and registered in the Cadastre Information System in 1995 using the method of designating boundaries.



Fig. 3. Map of Latvia with administrative division (Source: State Land Service, 2021)

When proposing a re-cadastral survey, the sequence of works took place according to a certain order. Feasibility study – for execution, the current documents from the State Land Service were requested for the cadastral survey of the land unit of the property "Smiltaines" and the production of the survey file. He received a printout of the real estate and its borderlands, as well as the historical, 1995, surveying office of the Madona district division of the State Land Service, the land boundary designation case of the Sarkaņi parish holding "Smiltaines" and the deposition/surveying of the boundaries of the border units. The most up-to-date material was on 30 June 1995 the land boundary in nature, set by the surveyor of the Madona Division Surveying Bureau of the State Land Service, in an area of 8.3 ha, which was based on the decision of the 16th session of the 20th convocation of 30 March 1992 and decision No. 23 of the Sarkaņi Parish Land Commission of 18 May 1995 (see Fig. 4.). The current cadastral value of the property "Smiltaines" and the land unit, before updating the situation in the information system of the State Real Estate Cadastre, was: Cadastral value of the land unit – 7059 EUR, designed cadastral value – 12620 EUR, Designed property valuation 14100 EUR. The purpose of use of property – land where the main economic activity is agriculture [Cadastre – from a medieval ..., 2013]. After evaluating the obtained documents, the surveyor concluded that it was necessary to conduct a study of the situation in the locality to verify the

compliance of the situation with the issued designating acts. Research on the area was completed on March 18, 2024. As a result of the study, the description of the boundary has been clarified, the position of the boundaries (see Fig. 5.) and the boundary signs have been determined: -Boundary points No. 2 (18, 11); 3; 4 (801, 10) not found in the locality; – Border Posts No. 5 (701); 8 (401); 9 (303); 1 (301) found in the locality, type of reinforcement – metal pipe, kupica flattened (see Figures 6, 7, 8, 9);- Border Posts No. 6 (601); 7 (402) a type of reinforcement was found in the area – a flattened kupica without a center. Boundary survey opinion is drawn up: -"Boundary Sign No.4 (801; 10) restoration in the locality. Border Signs No.5 (701); 8 (401); 9 (303); 1 (301) kupicas should be restored. The location of the boundary signs in the locality shall be consistent with the land boundary plans. Border Signs No. 6 (601); and 7 (402) cupcakes should be restored, and reinforcement centers should be installed. At boundary stage 2 (18; 11) – 3 boundary is determined along the side of the road, forming an intermediate plot with an adjacent land unit, where the boundary is determined along the middle of the road. The land of Sarkaņi parish is indicated as a borderland at this stage, therefore, an opinion on the non-compliance of borders and the Act for the elimination of border non-compliance should be prepared. Other elements of the situation along which the limit is set correspond to the registered boundary plans.

For the land unit, the boundaries are determined: in the border section from 1 – 2, the border is indicated along the middle of the ditch from the border sign to the border sign, in sections 2 – 3 from the border point to the border point along the edge of the parish road, in the border section 3 – 4 along the middle of the easement road from the border point to the border point, in section 4 – 1 along land lines from the border point to the border point.

In the issued documents in the real estate

The current land boundary plan has been drawn up based on the 1995 land boundary use materials on the scale of 1:10000 (see Fig. 4.).

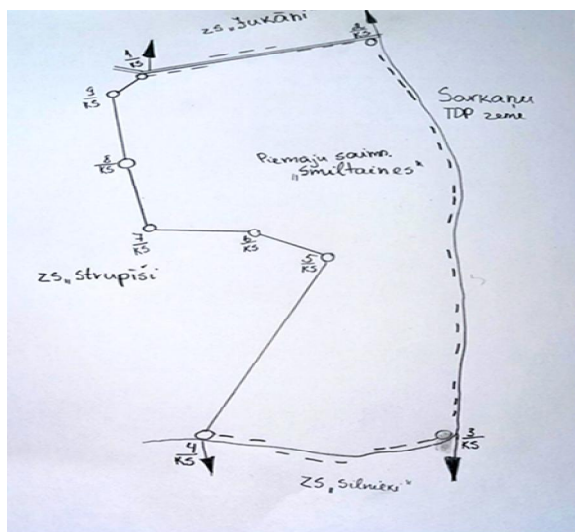


Fig. 4. Diagram of assigned boundaries (Source: Author's redraw)

"Smiltaines" Cadastre Information System on the land unit registered 6 structures, a residential house, a barn with a basement, a barn, a barn, a barn, a bathhouse, [SLS Cadastre information ..., 2023]

When carrying out a feasibility study, the descriptions and schemes of boundaries inserted in the deed of designation of land boundaries and the land unit, the boundary inconsistency in the boundary stage 2 (11) – 3 (10) has been established, where for the property to be measured the boundary stage is determined along the side of the road from the border point to the border point, but for the neighbor's land unit this section is determined along the middle of the road, resulting in an intermediate plot of 0.2 ha (see Fig. 5.).

Surveying and harmonizing boundaries in nature. Cadastral surveying of the land in nature was carried out by Certified surveyor Vilis Brikmanis and assistant surveyor Tina Rozenfelde. The survey was carried out at the same time as the feasibility study, measuring the restored boundaries. The Trimble R12GPS receiver S/N 6306F00131 was used to perform the measurements, using LatPos base stations as geodetic support points and RTK correction service. Coordinate system: LKS-92TM, Height system: LAS-2000,5; Latvian geoid model LV14. After the opinion was drawn up, the restoration work of the boundaries of the property in the locality was carried out, with the boundary signs located on the common boundary sections of this land unit and the neighboring land units being restored (see Figures 6., 7., 8., 9.) [On land reform ..., 2024].

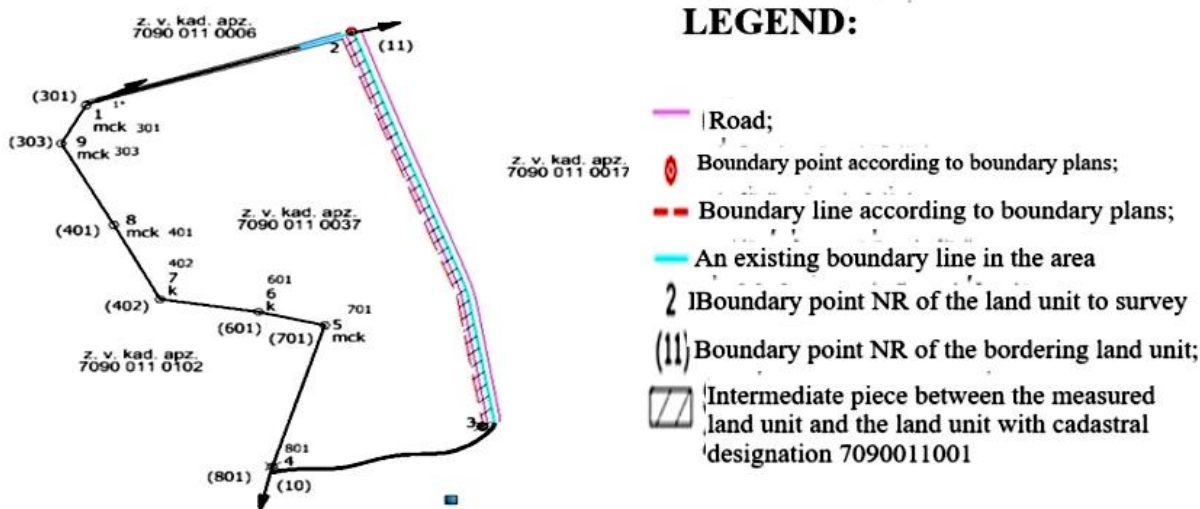


Fig. 5. Scheme of the established border situation (compiled by the author)



Chamber works. Using the executed measurements in nature and the obtained coordinates of border signs and boundary points, prepared the new information of the land unit for submission to the State Land Service: – on the points of the national geodetic network used, – Measurement files obtained by the global positioning method; – Contour plan; – List of areas of land use types (calculation); – List of coordinates of boundary points of the land unit; – Situational plan; – Encumbrance plan and

agreed encumbrance plan; – Land boundary plan.

Files to be submitted: – Measurement across; – Land boundary plan; – Encumbrance plan; – Situational plan; – Specially arranged boundary file; – Graphic part of cadastral information; Electronic copies of a paper-based document for scanned documents: •Border Survey and Renewal Act; •Opinion on border mismatches; •Border Mismatch Elimination Act; •List of documents in the electronic land cadastral file.



Figure 6. Boundary sign No. 701 (Source: author's archive).

Figure 7. Boundary sign No. (401) (Source: author's archive).

Figure 8. Boundary sign no. (301) (Source: author's archive).

Figure 9. Boundary sign no. (303) (Source: author's archive).

### Results and discussion

As a result of the performed Cadastral survey work, the total area of the real estate "Smiltaines" land unit, which was registered by specifying in the Cadastre Information System of the State Land Service, had decreased by 0.16 ha, from 8.3 ha to 8.14 ha. At the same time, 6 structures, a residential house, a barn with a basement, two barns, a barn, a barn, and a bathhouse were registered on this land unit in the Cadastre Information System. It was found that the structure/cell was not found in nature and an additional cadastral designation/barn was requested for the structure/bathhouse. After updating the land cadastral survey data in the Cadastre Information System, its cadastral value decreased by 3668 EUR, but the designed cadastral value decreased from 12620 EUR to 9049 EUR and the design property valuation decreased from 14100 EUR to 12620 EUR [How information ..., SLS].

As a result, for the owner in question, the tax on real estate decreased the following year.

Changes in the area and value of the property were affected by the necessary results of the border mismatch. When surveying the land unit in nature and performing executive measurements, an Opinion on the discrepancy of the boundary was drawn up, which concluded and recognized that the boundary at the boundary stage 2 (18; 11) – 3 was determined erroneously, so the boundary plan of the land unit is recognized as erroneous. As a result, the surveyor drew up an Act for the Prevention of Border Mismatch, where the established boundary non-compliance and its solution are expressed in the following wording: "In the opinion of April 2, 2024, on the non-compliance of borders, when evaluating the documents placed in the land units with cadastral designations 7090 011 0037 and 7090 011 0017 in the land cadastral survey files, when conducting a border survey and measurements in the locality, the surveyor finds that: At the boundary stage surveyed 2 (18; 11) – 3 boundaries is determined along the side of the road, thus forming an intermediate plot with the bordering land unit 7090 011 0017, for

which the boundary is determined along the middle of the road and the land of Sarkaņi parish is indicated as the borderland in this section. Having heard the views of the parties involved and based on the above-mentioned land unit 70900110037 the boundary plan is found to be erroneous. It is proposed to re-register the boundary to the middle

line of the axis of the road [Land cadastral survey ..., 2024]. Based on the fact that at the boundary stage 2 (18; 11) – 3 boundary set in the middle of the road, boundary signs 2 (18; 11) 3 there is no need to renew, to decide to address the discrepancy by indicating the boundary along the axis of the road (see Fig. 10.).

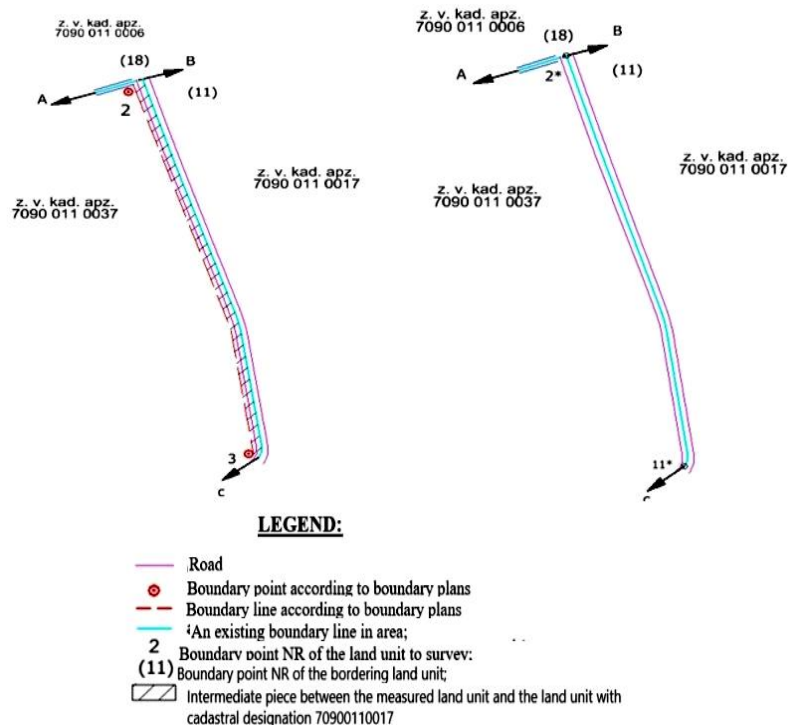


Fig. 10. Diagram of the solution to the border mismatch (Drawn by the author).

After updating the data in the State Land Service, 3 encumbrances have been registered, where 1 already existing encumbrance and 2 newly determined encumbrances: 1) – watercourses (regulated section of watercourses and specially excavated beds), as well as the area of the protective zone for the operation of a hydro-technical structure and device located on it on agricultural land – in the amount of 0.22 ha; 2) – the territory of the operational protection zone along the cable line of electrical networks – in the amount of 0.04 ha. 3) – road easement in the amount of 0.4 ha.

Discrepancies were found between the boundaries of the land unit indicated (on the photoplane) and the cadastral information updated, instrumentally measured, boundary for the land unit (see Fig. 11).

As a result of the development of the land cadastral survey file for the real estate "Smiltaines", a more accurate determination of the area

of the land unit was ensured, which further made it possible to more accurately calculate the annual tax of the Real Estate "Smiltaines", as well as clarified the coordinates of the installed boundary signs, which in the future will allow to restore them more accurately together with the boundaries of the property [On land reform ..., 2024]. The decision predicted that repeated, high-precision cadastral surveying works would be carried out later, according to the operational needs of the owners, if the results of accurate cadastral surveying work in the case of identical properties would differ from those obtained by marking methodology. To date, the practice of repeated cadastral surveying, comparing the changes in the parameters of land properties, has shown that the boundaries of the land properties and the established boundary marks are generally correctly formed, and recognized as correct, although changes in the parameters of specific properties were found because of the



repeated survey. Also analysing the comparisons of other designated properties with the results of cadastral instrumental surveying, it can be concluded that the most effective results were when photoplanes were available and used for the work of designating boundaries [Technical instructions ..., 1994]. These photographic materials provided opportunities to compare the situational images of the localities of specific properties, regardless of the results of the selection of information by the compiler of the photo plan, with aerial photography works performed in recent periods and orthophoto plans made from them [Land Survey Law, 2024].

Even without measuring the cadastral information, opportunities arose to identify, with a high degree of reliability and accuracy, changes in the situation of the terrain concerning the boundaries of the designated properties, the objects of the locality associated with it, as well as the situation in the property, and specifically what changes have occurred in the past years.

When performing repeated cadastral surveys of land holdings, previously registered, their owners in practice had to face situations where, when specifying the previously determined areas of land properties (which were already fixed in the Land Register), they had to be increased or reduced, and the changes could not be attributed only to the results of more accurate measurement.



Fig. 11. Comparison of the boundary indicated on the Photo Plan and instrumentally measured. [Thematic maps: Photo plans, 2024]

In very rare cases, cases of material error could be encountered because of designating processes. Consequently, some owners formed beliefs that the

accurate cadastral survey of land holdings is not beneficial for their owners. It requires a large expenditure of money so that the owner can restore and clarify to himself the boundaries of the property already known in advance, unchanged in nature, so that as a result they can be kept in the registers with greater accuracy, while at the same time making them known to interested parties and tax setters.

Guided by practical considerations, many landowners are therefore in no hurry, and are not in a hurry now, with the ordering of cadastral survey work on their properties, until there is no need, reason or interest to carry out activities with specific properties – for example, to change affiliation. The case of the land property "Smiltaines" considered in the example, in Sarkani parish, which had been on the property for 13 years since the display was made, when the demarcation act was drawn up on January 4, 1996, was typical and similar, until the moment when the owners needed to restore the borders and arrange the data in the information systems maintained by the state [Cadastral survey: laws and regulations..., 2024].

The next, confirmed in practice, conclusion was related to the boundary points of the property, where the presence of independent, well-established border signs served to find and restore almost infallible borders. Their existence significantly reduced the amount of border search/survey work, excluding disagreements between neighboring owners. If coordinates were also established for these boundary signs, then the work of finding and validating, or even restoring, borders and boundary points was feasible quickly and with indisputable quality indicators. The existence of coordinated border signs is particularly topical due to the possibilities of using modern technologies in the creation and maintenance of cadastre systems – such as geographic information systems, remote sensing technologies, and the creation and development of three-dimensional area models in the interests of registration and updating of land properties, not forgetting modern software for identifying changes in the situation of the locality [Cadastre, 2022].

## Conclusions

1. The real estate state cadastre information system established in the Republic of Latvia generally ensures the accumulation of current information on

cadastral objects according to the results of their survey.

2. In the course of the land registration process, the requirements of regulatory enactments were not always fully complied with, as a result of which there were situations where property-related documents were drawn up incorrectly.

3. Such situations could create precedents that, when performing some other surveying processes, the surveyor needed to perform additional work, such as preparing an opinion on border discrepancies and acts for the prevention of border discrepancies, in order to accurately arrange the documentation related to the property.

4. Despite the incorrect solutions encountered in the land registration processes, in general, further clarification of the data of such land units usually did not cause significant complications for the owners, but provided updated information in the Cadastre information system and more accurate real estate tax calculations (often reducing these taxes).

5. In general, the decision on land registration procedures made during the land reform – replacing the cadastral survey procedures should be considered useful, allowing the owners of restored land properties to start legally dealing with their properties much faster, when the number of cases of discrepancies encountered and their impact on the owners ability to act or border discrepancies were tiny 6. In the repeated clarification of the boundaries of real estate land properties, significant advantages were created in situations where the process of registration was carried out correctly.

7. The most effective data transformations and property corrections could be realized in cases – when geodetic coordinates were already obtained and available for boundary markers of border points – which radically facilitated the possibility of accurate and indisputable reconstruction of property boundaries in the area and the use of the advantages of new technological solutions for these work.

### References

- Bērziņa M., Rudzīte S., Paršova V., Krampuža D., Bindere S., Kalniņš G., Svilpe U., Vodinska V., Rudzīte G., Zadiņš J. (2013). *Cadastre – from a medieval toll list to a modern information system and a multifunctional cadastre*.
- Cadastral survey: laws and regulations governing cadastral survey of land. (2024). (*Kadastrālā uzmērīšana: Zemes kadastrālo uzmērīšanu regulējošie* normatīvie akti. [Skatīts 2024.gada 15.janvārī]. <https://www.vzd.gov.lv/lv/kadastrala-uzmerisana>)
- Cadastre. (2022). (Kadastrs. Skatīts2023.gada26.maijs). <https://www.vzd.gov.lv/lv/kadastrs>
- Cadastre – from a medieval toll list to a modern information system and a multifunctional cadastre. 2013. (*Kadastrs no viduslaiku nodevu saraksta līdz modernai informācijas sistēmai un daudzfunkcionālam kadastra. Valsts zemes dienests. Rīga*).
- How information is displayed on the cadastral map on the portal kadastrs.lv. SLS. (*Kā informācija tiek attēlota kadastra kartē portālā kadastrs.lv. VZD*) <https://www.vzd.gov.lv/lv/ka-informacija-tiek-attelota-kadastra-karte-portala-kadastrslv>
- National Encyclopedia: *Agrarian Reform in Latvia, 1920-1937*. (2022). (Nacionālā enciklopēdija: Agrārā reforma Latvijā, 1920.-1937.gads). <https://enciklopedija.lv/skirklis/31413>
- State Real Estate Cadastre Information System. (2022.) (Nekustamā īpašuma valsts kadastra informāciju sistēma). Skatīts 2024. gada 3. Martā. <https://www.vzd.gov.lv/lv/nekustama-ipasuma-valsts-kadastra-informacijas-sistema>
- On land reform in rural areas of the Republic of Latvia. (2024). (*Par zemes reformu Latvijas Republikas lauku apvidos*). <https://likumi.lv/ta/id/72849-par-zemes-reformu-latvijas-republikas-lauku-apvidos>
- Technical instructions for designating the boundaries of land properties (uses) in nature. (1994): State Land Service of the Republic of Latvia, Riga. (*Tehniskie norādījumi zemes īpašumu (lietojumu) robežu ierādīšanai dabā (1994): Latvijas Republikas Valsts zemes dienests, Rīga*.)
- Technical instructions for the implementation of the first round of land reform in rural areas of the Republic of Latvia: II technical instructions, delimitation of land use in nature (1992): (Tehniskie norādījumi zemes reformas pirmās kārtas īstenošanai Latvijas Republikas lauku apvidos: II tehniskie norādījumi, zemes lietojumu robežu ierādīšana dabā (1992): Latvijas Republikas Lauksaimniecības ministrija, Rīga). Ministry of Agriculture of the Republic of Latvia, Riga.
- Thematic maps: Photo plans. (2024). (*Tematiskās kartes: Fotoplāni, 2024*). [Skatīts 2024.g 26.aprīlī] [https://www.kadastrs.lv/services/thematic\\_maps/steps/start?reset=1](https://www.kadastrs.lv/services/thematic_maps/steps/start?reset=1)
- SLS Cadastre information for cadastral survey of land. (Printout date: 01.03.2023). (VZD Kadastra informācija zemes kadastrālajai uzmērīšanai: Izdrukas ID: i390002196302) <https://www.kadastrs.lv/>
- Land Survey Law. (2024). Zemes ierīcības likums. Skatīts 2024. gada 3.aprīlis. <https://likumi.lv/ta/id/144787-zemes-iericiba-likums>
- Zemes kadastrālā uzmērīšana. (*Cadastral survey of the earth*.) [Skatīts 2024. gada 15. marts] Pieejams: <https://www.latvijasmernieks.lv/zemes-kadastrala-uzmerisana>

Land cadastral survey regulations No.1019. (*Zemes kadastrālās uzmērīšanas noteikumi Nr.1019. Skatīts 2024.gada 8.maijs*). <https://likumi.lv/ta/id/243225-zemes-kadastralas-uzmerisanas-noteikumi>

Mierkalne, J. (2012). Land reform – the key to property. (*Zemes reforma – atslēga uz īpašumu Mierkalnes redakcijā*. Rīga: LR VZD). *SLS of the Republic of Latvia*. 335 pp.

Армандс ЦЕЛМС<sup>1a</sup>, Ігор ТРЕВОГО<sup>2</sup>, Павло КОЛОДІЙ<sup>3</sup>, Джоланта ЛУКСА<sup>1b</sup>, Маріс ВІРКАВС<sup>1</sup>, Томс ЛІДАМНІКС<sup>1,4</sup>

<sup>1</sup> Латвійський університет природничих наук і технологій, e-mail: <sup>1a</sup>armands.celms@lbtu.lv,

<sup>1a</sup> <https://orcid.org/0000-0002-9673-1734>; <sup>1b</sup> <https://orcid.org/0000-0002-9673-1734>

<sup>2</sup> Національний університет «Львівська політехніка», 79013, Львів, вул. С. Бандери, 12; <https://orcid.org/0000-0002-2368-9088>

<sup>3</sup> Львівський національний екологічний університет, <https://orcid.org/0000-0001-9847-9520>

<sup>4</sup> Латвійське агентство геопросторової інформації

### ЗЕМЕЛЬНО-КАДАСТРОВА ЗЙОМКА НЕРУХОМОГО МАЙНА В МІСТІ МАДОНА ЛАТВІЙСЬКОЇ РЕСПУБЛІКИ

Основне значення в землеустрої території держави має земельно-кадастрова зйомка. Це стосується як земельної власності всередині країни, так і зовнішніх кордонів країн, включаючи демаркацію державного кордону. При переході від загальновласницької системи землекористування в СРСР до попередньої самостійної системи власності на землю, яка існувала в Латвійській республіці, система державного управління зіткнулася з необхідністю здійснення земельної реформи, переходячи від беззаявної власності на землю до індивідуальної та колективної власності на землю в країні. Важливо було мати політичну позицію, максимально повернути майно колишнім власникам чи спадкоємцям. Минуло понад 50 років після ліквідації права приватної власності на землю, багато правових документів на землю було втрачено. Були випадки втрати чи навіть умисного знищення меж чи межових знаків колишніх земельних ділянок. Тому, правильні та швидкі процедури відновлення прав власності на землю виглядали складними, дорогими та, зрештою, довготривалими. Особливо це стосується процесів і можливостей зйомки меж земельної власності, визнаючи, що інструментальна (геодезична) зйомка земельної ділянки на території була і є найкращим способом для цього, але вона повинна була бути реалізована в надзвичайно великих обсягах і максимально швидко, не блокуючи легальну господарську діяльність на земельних об'єктах в країні. Здатності наявних, підготовлених спеціалістів (геодезистів) та підприємців-геодезистів для проведення геодезичних робіт також були незначними. Тому, було прийнято рішення в рамках земельної реформи запровадити спрощене визначення меж земельних ділянок за методикою нанесення розмітки, яка розроблена та затверджена для використання як методика кадастрової зйомки-нанесення. На його основі підготовлено документи, передбачені нормативними актами, які слугували для прийняття юридично обов'язкових рішень щодо права власності та користування земельними об'єктами. Водночас спрощена реєстрація власності створила основу для заходів з планування територій місцевих муніципалітетів та організації господарської діяльності. У рішенні передбачено, що повторні високоточні кадастрові зйомки будуть проводитися пізніше, відповідно до оперативних потреб власників, якщо результати точних кадастрових зйомок у випадку ідентичних об'єктів будуть відрізнятися від результатів, отриманих за методикою нанесення позначок. На сьогоднішній день практика повторних кадастрових зйомок, зіставлення змін параметрів земельних об'єктів, показала, що межі земельних об'єктів та встановлені межові знаки в цілому сформовані правильно та визнані правильними, хоча зміни параметрів. специфічні властивості були виявлені внаслідок повторного обстеження. Зміни не створили неприйнятних наслідків для користувачів майна та систем обліку. Як приклад, в дослідженні розглядається порівняння результатів однієї земельної власності, спочатку зареєстрованої, та пізніше кадастрово виміряної, що підтверджує обґрунтованість рішення, прийнятого в інтересах реформи. На початку передбачається виконувати спрощені роботи по визначенню власності, залишаючи трудомісткі геодезичні технології для подальшого уточнення зареєстрованої власності протягом більш тривалого періоду – відповідно до потреб використання.

*Ключові слова:* земельна реформа, земельно-кадастрова зйомка, власність на землю, межі земельних ділянок, нормативні акти

Received 09.09.2024